

Session No. 24

Course Title: Coastal Hazards Management

Session Title: Mitigation Defined

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Time: 50 Minutes

Objectives:

- 24.1 To understand the relationship between hazards, the built environment and disasters.
 - 24.2 To understand the concept of mitigation per se and as a societal value.
 - 24.3 To understand the four phases of emergency management and the location of the mitigation phase.
 - 24.4 To understand that there are many different approaches to mitigation and to become familiar with a variety of mitigation policies, programs, practices and projects.
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Scope:

The fundamental purpose of this session is to insure that the students have a solid understanding of the concept of mitigation and its relationship to natural hazards and disasters.

In addition this session will inform the students of different approaches to mitigation and will provide them with some specific examples.

Readings:*Student and Instructor Readings:*

Godschalk, D., D. Brower, T. Beatley, *Catastrophic Coastal Storms*. 1989. Durham, NC., Duke University Press, Chapters One and Two

Power Point Slides:

[PowerPoint 16.1 Definition of Hazards]

[PowerPoint 16.2 Definition of Natural Hazard]

[PowerPoint 16.3 Definition of Disaster]

[PowerPoint 16.4 The Relationship Between Hazards and Disasters]

[PowerPoint 24.1 Definition of Mitigation]

[PowerPoint 24.2 Four Phases of Emergency Management]

[PowerPoint 24.3 Approaches to Mitigation]

[PowerPoint 24.4 Types of Mitigation Strategies]

[PowerPoint 24.5 Examples of Mitigation Activities]

Handouts:

[Handout 24.1 Types of Mitigation Strategies]

General Requirements:

This session should be presented as a lecture supported by PowerPoint slides but there is ample opportunity for class involvement and this should be encouraged.

This session is founded on Session 16 and therefore it would be advantageous for the students to review that session before coming to class.

The instructor might ask the class to prepare for this session by picking a hazard e.g. hurricane, flood, erosion, etc and then imagine how the various mitigation strategies e.g. structural, non-structural, etc might work to mitigate the impacts of that hazard.

Objective 24.1 To understand the relationship between hazards, the built environment and disasters.

Requirements:

The content of this objective should be presented as a lecture/discussion supported by PowerPoint slides.

[PowerPoint 16.1 Definition of Hazard]

[PowerPoint 16.2 Definition of a Natural Hazard]

[PowerPoint 16.3 Definition of Disaster]

[PowerPoint 16.4 The Relationship Between Hazards and Disasters]

Remarks:

Refer back to Session 16. (The PowerPoint slides are included in this session for your convenience)

Go through the slides with the class. Rather than you discussing each of the slides again you might ask the class to tell you, and each other, the meaning and importance of each of the concepts. You might explain to the class that these concepts are fundamental to the whole course and therefore (1.) they will be using them in practice and probably be called upon to define them for others and (2.) they should not be surprised to see them on the final exam.

After you have gone through all four of the slides but before you leave the last slide call the students attention again to the last three lines:

1. Natural Hazards cannot be managed. You cannot manage a hurricane, or a tornado, or an earthquake. They happen. They are a part of the natural environment we live in.
2. Human activity can be managed. Within limits defined by many things including human nature and constitutional law public policy can manage or guide human activity toward certain things and away from others.

3. Mitigating the impacts of natural hazards involves managing human activity. Who does what, where, and how much? If the impact of natural hazards on human beings and their activities is to be avoided or at least diminished then human beings are going to have to act in ways that will accomplish that. For example public policy can encourage human activity to move to areas that are less vulnerable to the impacts of natural hazards.
 4. Mitigation as a value. Ask the students to explain this. Answer: Mitigation suggests that society should do things differently than they are usually done. E.g. Do not build in hazardous areas.
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Objective 24.2 To understand the concept of mitigation.

Requirements:

The content of this objective should be presented as a lecture/discussion supported by PowerPoint slides.

[PowerPoint 24.1 Definitions of Mitigation]

Remarks:

Definitions:

- To mitigate: "To make or become less severe or intense; moderate." American Heritage Dictionary 1985.
- Mitigation is defined as the "sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects". FEMA

It is probably worthwhile to point out that there is a major difference between the dictionary definition and the FEMA definition. Ask the students to point it out.

(**Answer:** the time dimension. FEMA emphasizes "sustained actions" and "long term risks". This is probably implicit in the dictionary definition but the emphasis FEMA places on it is worth noting.)

Ask the student why they think that FEMA added this dimension to the standard definition. (**Answer:** good public policy. If the public is going to invest resources in solving a problem it is wise to insure that it is a long term solution not just a stop gap measure.)

Objective 24.3 To understand the four phases of emergency management and the location of the mitigation phase.

Requirements:

The content of this objective should be presented as a lecture/discussion supported by PowerPoint slides.

[**PowerPoint 24.2** The Four Phases of Emergency Management]

Remarks:

The Four Phases of Emergency management: Emergency management activities are typically organized into four phases which constitute the “**Cycles of Emergency Management.**” These phases are:

1. **Mitigation** - this phase involves activities that prevent a disaster, reduce the chance of it happening, or reduce its damaging effects. Mitigation activities should be undertaken long before a disaster occurs as part of a long-term strategy to reduce or prevent the loss of life and property damage likely to occur from a variety of natural and technological disasters. Examples include the rezoning of undeveloped residential areas located in a floodplain to resource conservation areas, and retrofitting the infrastructure of buildings and bridges to meet stronger seismic standards to resist the effects of earthquakes. Mitigation is the primary focus of this course and will be explored in great detail in the coming sessions..
2. **Preparedness** - since mitigation alone cannot prevent or eliminate the impact from most disasters, it is necessary to make plans and preparations for disaster events. Preparedness activities include coordination of emergency management personnel from different jurisdictions, the establishment of forecasting and warning systems, and identifying facilities to act as storm shelters.
3. **Response**- the preparedness phase lays the groundwork for the response phase, which involves actions taken immediately after the onset of a disaster. stated differently, response activities occur **during** the initial impact of a disaster. It is intended to provide emergency assistance for casualties, including research and rescue operations, and the provision of shelter and medical care. Additional measures include actions taken to prevent secondary damage such as sandbagging against impending flood waters and anti-looting security patrols. The phase also involves damage assessment, which provides the basis for federal assistance.

4. **Recovery** – the recovery phase commences after the initial impact. Recovery activities are geared towards returning all systems to normalcy, and can continue long beyond the emergency period immediately following a disaster. They can be broken down into short-term and long-term activities. Short-term activities attempt to return vital human systems to minimum operating standards and usually encompass approximately a two-week period. For example, an emergency repair to the water system might be necessary, or crisis counseling may help victims of catastrophic loss. Long-term activities stabilize all systems. These include such functions as redevelopment loans, legal assistance, community planning, and radiation exposure control, which can last as long as years after a disaster.

Experience shows that these phases are cyclical rather than linear in their interrelationships. All activities and experiences lead individually and cumulatively back to the mitigation phase – we learn to prevent and diminish future emergencies from past events, whether through actual emergencies or simulations of response activities. The disaster or emergency, actually or potential can be seen as the motivating force for the motion of the cycle.

Unfortunately mitigation is often neglected until after a disaster actually occurs. In the case of natural disasters, history is filled with examples of communities which rebuilt in the same places, in the same manner as previously, only to suffer the same perils from when disasters recurred. Mitigation seeks to break the cycle of unnecessary destruction and reconstruction by adapting human settlement patterns and construction techniques to reflect the threat posed by potential hazards.¹

¹ Adapted from Blanchard, B.W. (1977) Emergency Management USA. Student Manual. Emmitsburg, MD Emergency Management Institute, pg 21.

It will be seen in other sessions that mitigation, rather than being only a discrete phase isolated from the others, is often (and should be) an integral part of the other phases.

Objective 24.4 To understand that there are many different approaches to mitigation.

Requirements:

The content should be presented as a lecture supported by PowerPoint slides.

[PowerPoint 24.3 Approaches to Mitigation]

[PowerPoint 24.4 Types of Mitigation Strategies]

[PowerPoint 24.5 Examples of Mitigation Activities]

[Handout 24.1 Types of Mitigation Strategies]

Remarks:

There are many different approaches to mitigation. The objective is to simply display many of the approaches that will be discussed later so that the students understand that mitigation is not just a single policy that can be used in all situations. It is not a "one size fits all" sort of policy.

1. Structural and non-structural mitigation

- A. Structural mitigation relies on building structures that will "stiffen" the environment and thus (in theory at least) protect human beings and their activities; and on building buildings that are stronger and thus (again in theory at least) better able to withstand the impact of a hazard.
- B. Non-structural mitigation relies on manipulating the characteristics of development other than strengthening them. It relies more on location of structures and activities, e.g. locating them in areas that are less vulnerable to natural hazards.

Neal Frank, who was the long time Director of the National Hurricane Center, had a slide show that consisted of images of structures that were advertised as "hurricane proof". He would show an image of the structure before an event and then after the event...frequently with tragic results for people who had chosen to rely on the "hurricane proof" nature of the building and ride out the storm inside it.

2. Existing Development and Potential Development

- A. Following a disaster, or even prior to a disaster, it is very common for mitigation activity to focus on existing structures. "How do we save the tax base?" The result usually is large capital expenditures on infrastructure, relocation of structures, and retrofitting. Some view this as "correcting past mistakes".
- B. These are important and probably inevitable activities but even more important is preventing the mistakes from being made in the first place. As will be seen there are mitigation policies, practices and programs that can be used to guide growth and development out of hazardous areas before they develop thus avoiding the trauma and expense incurred when it becomes necessary to recover from damage inflicted by a natural hazard on unwisely located development.

3 .Types of Mitigation Strategies

- Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Public Information

Handout 24.1 should have been handed out and assigned in the previous session.

Class Discussion:

1. What types of emergency management efforts should be considered mitigation activities? Name some that do not constitute mitigation. Have the class consider the following activities (appropriate responses/classifications are given in parentheses):
 - Structural reinforcement of hospital walls to meet higher seismic safety standards(structural mitigation)
 - Securing a water heater to a wall (structural mitigation)
 - Installing automatic sprinklers in a building (some might say preparedness, but since the sprinklers lessen the effects of the hazard it can be considered mitigation)
 - Incorporation of risk assessment information into a land use plan and ordinance(nonstructural mitigation)
 - Purchase of warning systems (preparedness)
 - Stockpiling of food, water and supplies (preparedness)
 - Evacuation of an area (Reasonable people have different views on this. Some say that evacuation lessens the impact because there are fewer people around to be injured and therefore it is mitigation. Others say that it lacks the "long term" nature of mitigation and therefore is not mitigation. Others argue that by assuring people that there are workable evacuation methods this makes them more comfortable living in a hazardous area and thus exacerbates the situation rather than mitigating it. Probably the best answer is: does it really make much difference what you call it? Evacuation is a good idea what ever it is called.)

- Insurance: Insurance allows the risk to be spread out so that many share the cost. Is this mitigation? It lessens the financial impact on the owner of damaged property but does it reduce the impact of the hazard?
- Zoning Ordinance (non-structural mitigation) (Question: What if the zoning ordinance allows development in hazardous areas?)
- Storm Water Management System (structural mitigation) (But if it includes land use planning that lessens run off then it is non-structural.)

2. Name some potential hazard mitigation measures for each of the following types of hazards (comments appear in parentheses)

Flood	Dam construction/inspection (built environment) Construct/protect retention basins (built environment) Reforest/prevent deforestation (natural environment) Contour farming (agricultural) Flood proof buildings (built environment) Preparedness examples: Sandbagging, stream flow monitoring
Fire	Develop sound fire codes (nonstructural mitigation) Create fire breaks (natural environment) Fire zoning (nonstructural mitigation) Preparedness examples: Smoke detectors, fire drills
Hurricane	Coastal wetlands protection (natural environment) Coastal zone management Replace coastal sand dunes Construct breakwaters/levees/seawalls Install shutters (structural mitigation) Preparedness examples: Storm tracking, shutter/board up windows
Nuclear Plant Accident	Site planning Plant safety codes/inspections Environmental impact research/statements Plant operator training Preparedness examples: Contamination monitoring, evacuation plan, emergency procedures rehearsal.

Handout 24.1: Types of Mitigation Strategies

Types of Mitigation Strategies

1. Prevention

Preventive activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventive activities include:

- ♦ Planning
- ♦ Zoning and subdivision
- ♦ Open space preservation
- ♦ Floodplain regulations
- ♦ Stormwater management
- ♦ Drainage system maintenance
- ♦ Capital improvements programming
- ♦ Shoreline/fault zone setbacks

2. Property Protection

Property protection measures protect existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

- ♦ Relocation
- ♦ Acquisition
- ♦ Building elevation
- ♦ Critical facilities protection
- ♦ Windproofing
- ♦ Floodproofing
- ♦ Sewer backup protection
- ♦ Insurance
- ♦ Seismic Retrofit
- ♦ Safe rooms

3. Natural Resource Protection

Natural resource protection activities reduce the impacts of natural hazards by preserving or restoring natural areas and their mitigative functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies and organizations often implement these measures. Examples include:

- ♦ Floodplain protection
- ♦ Beach and dune preservation
- ♦ Riparian buffers
- ♦ Fire resistant landscaping
- ♦ Fuel breaks
- ♦ Erosion and sediment control
- ♦ Wetland preservation and restoration
- ♦ Habitat preservation
- ♦ Slope stabilization

4. Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environment or natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- ♦ Reservoirs
- ♦ Levees/floodwalls/seawalls
- ♦ Diversions
- ♦ Channel modifications
- ♦ Beach nourishment
- ♦ Storm sewers

5. Public Information

Public information activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- ♦ Outreach projects
- ♦ Hazard map information
- ♦ Real estate disclosure
- ♦ Warning systems
- ♦ Library
- ♦ Technical assistance
- ♦ School children education

